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April 25, 1996

EX PARTE

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William F. Caton
Acting Secretary
Federal Communications Commission
Mail Stop 1170
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Dear Mr. Caton:

Re: *CC Docket No. 93-162*

Today representatives of Pacific Telesis participated in an Ex Parte contact via conference call on the above referenced proceeding. Participating for Pacific were Cathie Shelton (Executive Director - Business Marketing Strategy), Jeff Thomas (Senior Counsel), Phyllis Bertram (Regulatory Group Manager) and myself. Participants in the call from the Common Carrier Bureau's Policy & Program Planning Division were Paul D'Ari and Claudia Fox.

Pacific's personnel discussed the impact of Network Equipment Building Systems (NEBS) requirements on the design and sizing of physical collocation spaces within our central offices. Copies of the written materials utilized are attached.

We are submitting two copies of this notice in accordance with Section 1.1206(a)(1) of the Commission's rules.

Please stamp and return the provided copy to confirm your receipt. Please contact me should you have any questions.

Sincerely,

Jay Bennett

Attachments

cc: Paul D'Ari
Claudia Fox

No. of Copies rec'd 0+1
List ABCDE

GENERIC REQUIREMENTS
GR-63-CORE
ISSUE 1, OCTOBER 1995

Comments Requested
(See Preface)

Network Equipment-Building System (NEBS) Requirements: Physical Protection

(A Module of LSSGR, FR-64; TSGR, FR-440; and NEBSFR, FR-2063)

Bellcore

This document, GR-63-CORE, Issue 1, October 1995, replaces:

TR-NWT-000063, Issue 5, September 1993.

For ordering information, see the References section of this document.

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2. Spatial Requirements

2.1 General Requirements

The following criteria apply to equipment frames, distribution and interconnecting frames, and dc power plant equipment. Additional requirements unique to each of these are in Sections 2.2, 2.3, and 2.4, respectively. Section 3 of this document provides criteria for a new frame. Some of the criteria in this section may not apply to Section 3.

R2-1 [1] All equipment frames shall have a hole pattern on a flat horizontal surface on the base of the frame for anchoring to building floors. The hole pattern shall permit lateral relocation of the fasteners to avoid interference with reinforcement bars. Access to the anchoring hardware with electronics in place and operating is required for verification that hardware continues to meet torque requirements. Use Figure 2-1 as a guide.

The equipment-base floor anchor bolt system shall be designed so the equipped framework can be fitted laterally into its space under an existing cable distribution system and then secured to the building floor with appropriately sized anchors. See Section 4.4.2 for concrete expansion anchor criteria.

R2-2 [2] The frame base and anchoring method shall provide for a self-supporting equipment frame that can withstand overturning moments caused by cable-pulling or earthquake effects without auxiliary support or bracing from the ceiling or side walls. As a minimum, the floor anchoring method shall withstand the overturning load of a 45 kg *(99.2 lb)* applied at the top of the frame in any horizontal direction.

R2-3 [3] Any frame, when packaged for transit and accompanied or supported by the usual handling facilities, shall fit through typical equipment entrances 1219 mm *(4 ft)* wide and 2438 mm *(8 ft)* high.

To help ensure that different types of frames fit together to form orderly, straight equipment frame lineups, all frames shall comply with the following criteria:

O2-4 [4] Frames of only one depth should be used in a frame lineup.

R2-5 [5] No part of any frame or apparatus attached to the frame (including installed cables) shall extend horizontally beyond the front or rear edges of the base (or guardrail) of the frame.

R2-6 [6] Means to level and plumb the frames and to compensate for variation in floor flatness, such as wedges, shims, or leveling screws, shall be part of, or available for, the frame.

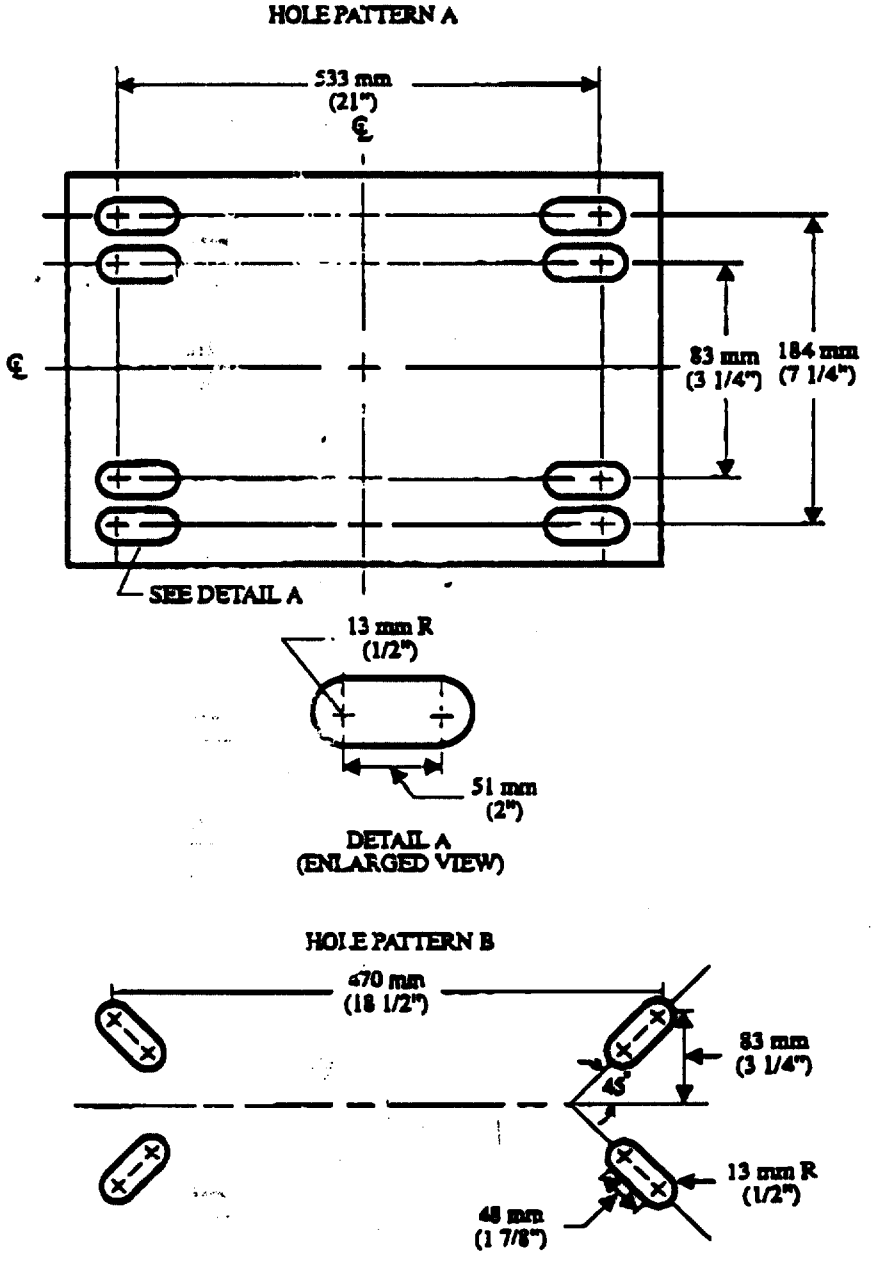


Figure 2-1. Framework Base (Typical) — Floor Anchoring Hole Pattern

O2-7 [7] The fronts of the base of all frames should be aligned.

O2-8 [8] In the lineup, side clearance of at least 2 mm *(0.08 in)* should be provided between adjacent frames.

2.1.1 Equipment Frame Floor Plans

O2-9 [9] Floor plans should provide a high degree of standardization while maintaining enough flexibility to permit natural growth from the initial to the ultimate equipment configuration. For 305-mm *(12-in)* deep frames, the 6-lineup plan shown in Figure 2-2 should be used.

For multiframe systems with high heat release, excessive weight or great quantities of cabling, the aisle spacings should be increased to limit the floor loading to less than 560 kg/m^2 *(114.7 lb/ft^2)* per Section 2.2.5 and/or heat dissipation to less than 860 W/m^2 *(79.9 W/ft^2)* per Table 4-6. Figure 2-3 illustrates a floor plan for 457-mm *(18-in)* deep frames which require the wider aisle spacing to meet the above criteria.

Equipment frames that can be maintained and wired from the front can be located along a wall with a nominal 76-mm *(3-in)* rear clearance. These frames are preferred for remote terminal applications.

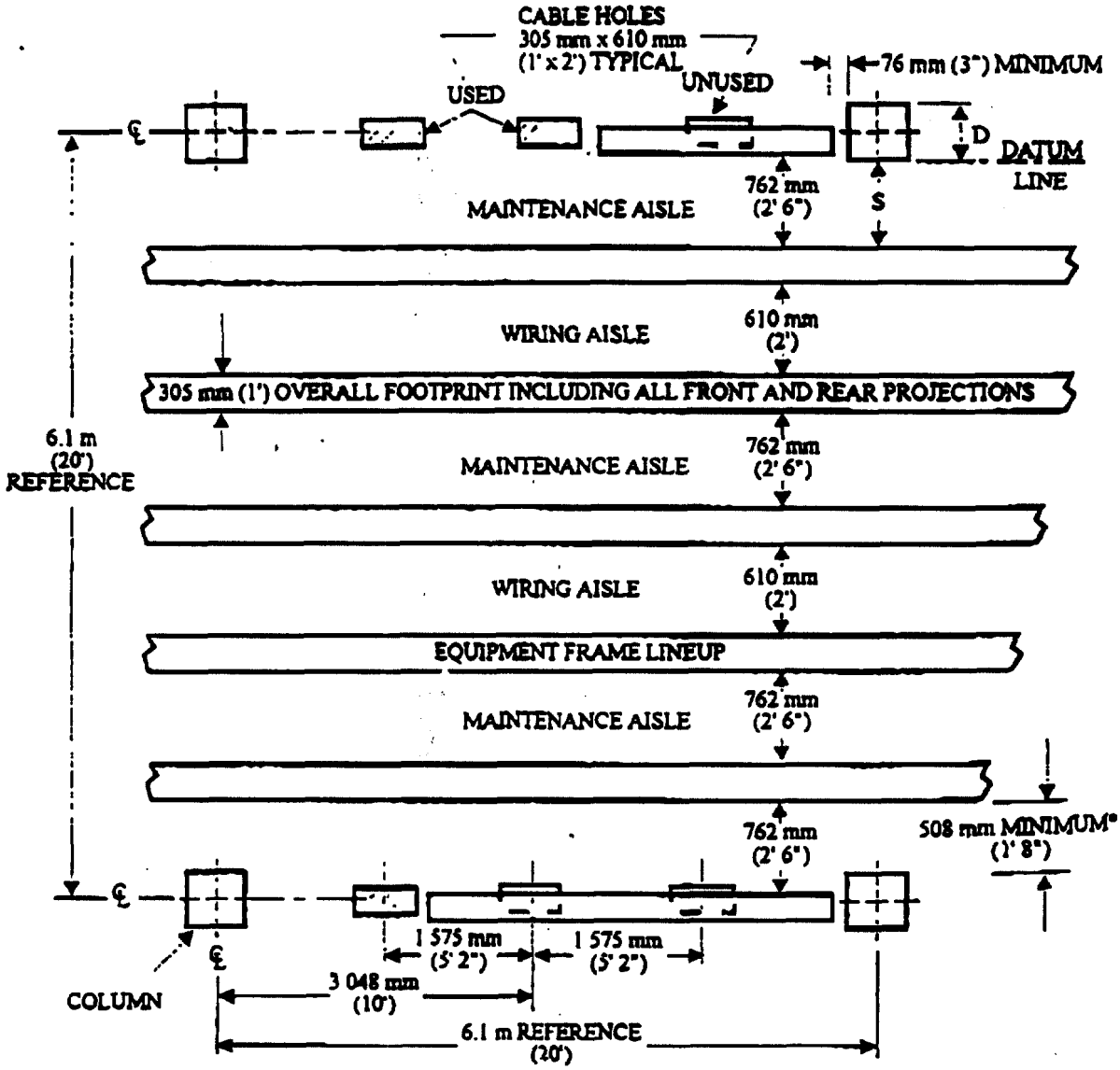
Not all frames can be used in these floor layouts. For example, it may be necessary to include lineups of different depths in one building bay, or a special frame may require an exceptionally wide maintenance aisle. Such cases may dictate nonstandard floor plans. Plans should, however, adhere to the 700-kg/m^2 *(143.4-lb/ft^2)* floor load allocation for all equipment, including cable and lights.

O2-10 [10] Floor plans should be designed to ensure that all equipment functions together effectively without excessive special engineering or poor use of building space and services.

O2-11 [11] Floor plans for equipment on raised floors should permit the removal of floor panels in the aisles without disturbing the equipment frames.

2.1.2 NEBS Data (ND)

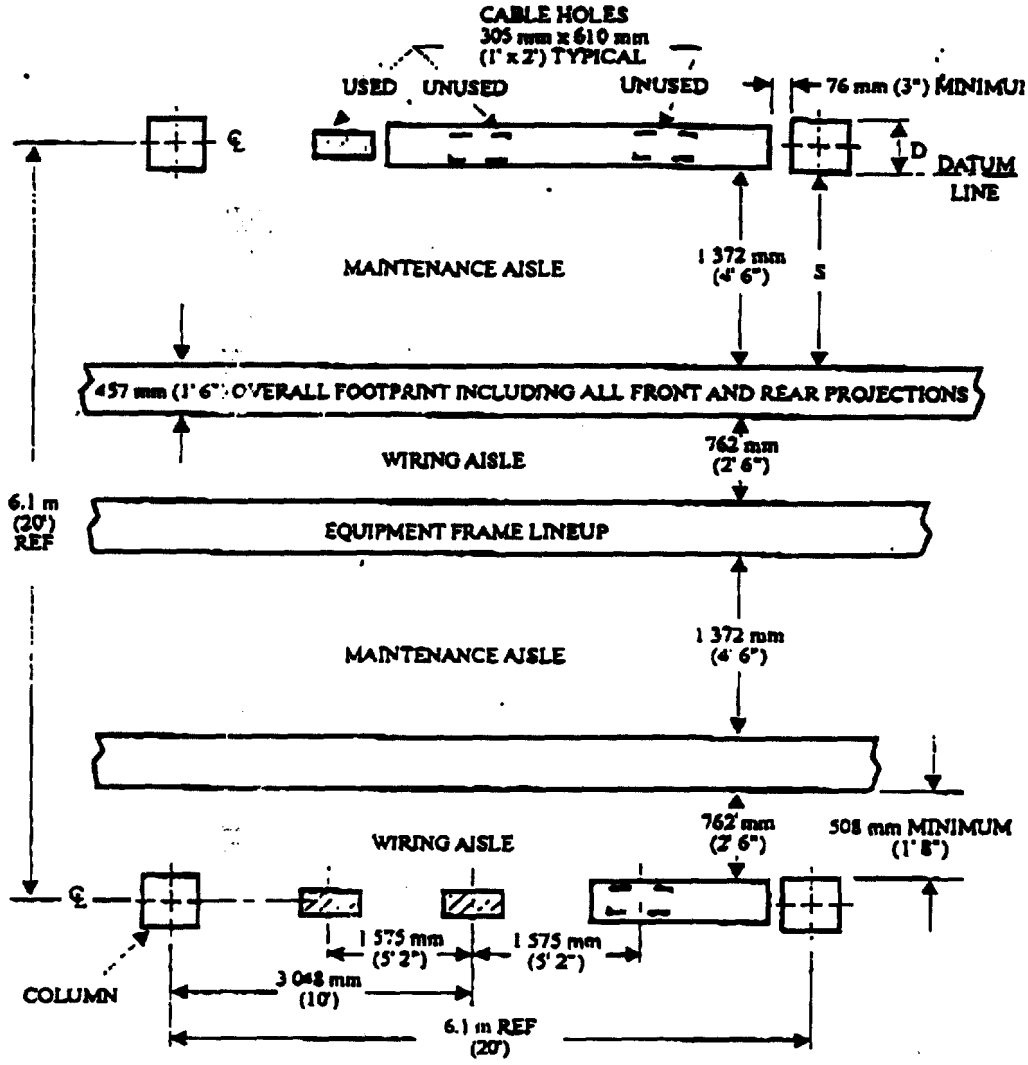
R2-12 [12] The equipment supplier should document the equipment data described in Appendix A.



COLUMN DEPTH "D"	559 mm (1' 10") OR LESS	610 mm (2')	660 mm (2' 2")	711 mm (2' 4") OR GREATER
SPACE AT COLUMN FACE "S"	762 mm (2' 6")	711 mm (2' 4")	660 mm (2' 2")	610 mm (2')

* For column depths greater than 711 mm (2' 4"), it may be necessary to omit some frames in the equipment lineup opposite columns (wiring aisle side).

Figure 2-2. Typical 6-Lineup Floor Plan for 305-mm (12-in) Deep Frames



COLUMN DEPTH "D"	559 mm (1' 10") OR LESS	610 mm (2')	660 mm (2' 2")	711 mm (2' 4") OR GREATER
SPACE AT COLUMN FACE "S"	1 372 mm (4' 6")	1 321mm (4' 4")	1 270 mm (4' 2")	1 219 mm (4')

Figure 2-3. Typical 4-Lineup Floor Plan for 457-mm (18-in) Deep Frames

2.2 Equipment Frames

An equipment frame consists of a structural framework that occupies floor space and all the equipment mounted on it. Examples of frames include cabinets, relay racks, consoles, disk and tape drivers, and battery stands. This section covers all the types of frames that may be installed in lineups in equipment areas of network facilities. These requirements are unique to these types of equipment. Some of the criteria in this section may not apply to the frame discussed in Section 3.

2.2.1 Vertical Space Allocation in an Equipment Frame Area

Figure 2-4 shows the typical configuration for an equipment frame area. On the left in the figure is the typical configuration for conventional cooling systems. These all-air systems usually use central fan rooms, overhead ducts, and diffusers to distribute air. On the right is the typical configuration for a modular cooling system that may be used in equipment areas with high heat dissipation. These systems may feature combinations of one or more of the following: water-cooled process coolers located among the equipment frames, plenum raised floors or plenum ceiling for local air distribution, chilled water piping, and some cabling.

The vertical space is typically allocated as follows:

Below raised floor (when used)	Air supply plenum, mechanical and electrical services, or cabling
Floor (or top of raised floor) to 3048-mm level *(10-ft level)*	Equipment frames, cable distribution, and lights
Over 3048-mm level *(10-ft level)*	Cooling air ducts and diffusers or air supply plenum

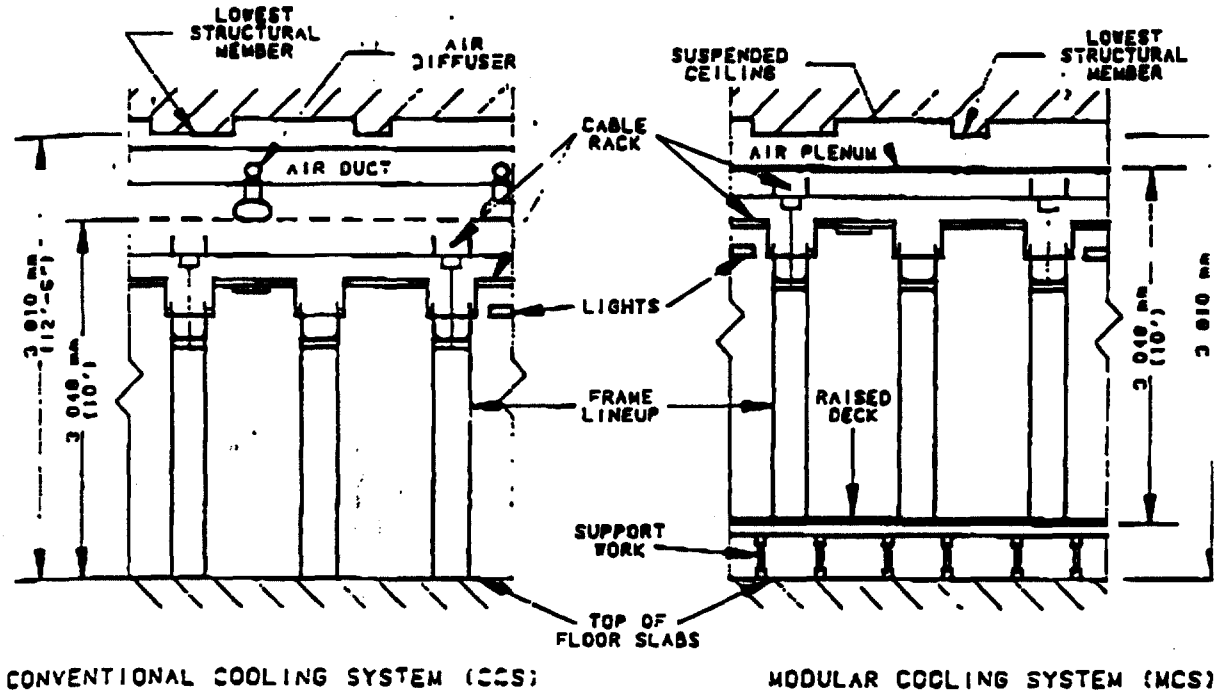


Figure 2-4. Typical Equipment Frame Area (Vertical Section)

2.2.2 Equipment Frame Dimensions

Figure 2-5 shows the overall dimensions of equipment frames.

These dimensions include any equipment that is part of the frame or routinely left attached to the frame, particularly any front or rear projections, such as knobs, paper guides, or cable.

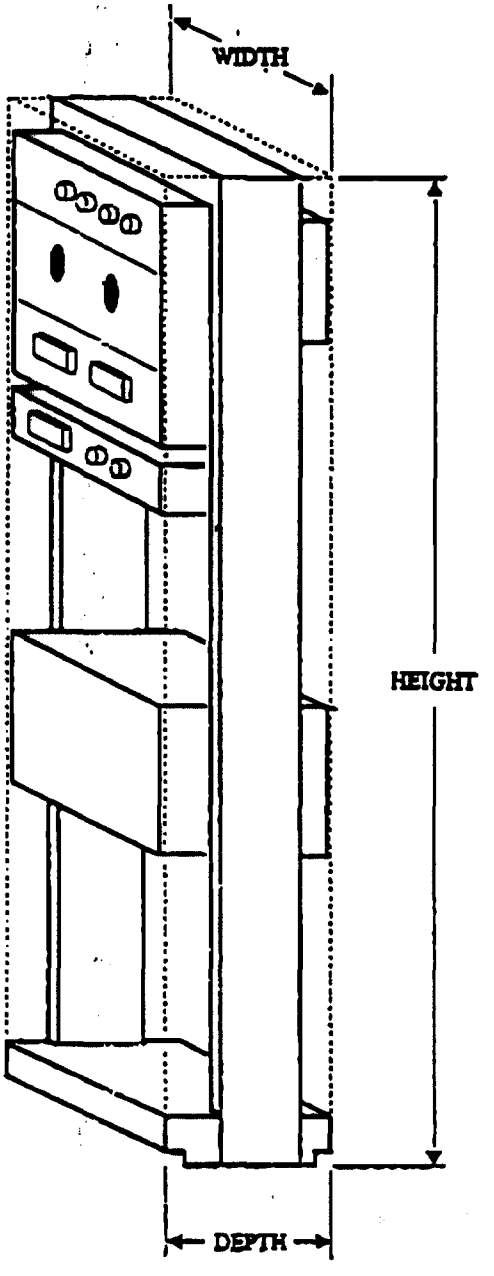


Figure 2-5. Equipment Frame — Overall Dimensions

O2-13 [13] Frames with their system cable racks should not exceed 2743 mm *(9 ft)* in height above the floor.

A frame with its system cable racks exceeding a height of 2743 mm *(9 ft)* may be used with the requirements in this document. In offices with a clear ceiling height of 3810 mm *(12 ft, 6 in)*, the above frame will reduce the vertical space allocated to via racks and the mechanical systems.

O2-14 [14] Equipment designed for traditional applications in established equipment environments should have the following nominal dimensions:

Height - 2134 mm *(7 ft)*

Width - 660 mm *(2 ft, 2 in)*

Depth - 305 mm *(12 in)*.

Frames may exceed the nominal dimensions for width and depth when placed in a special lineup where the minimum maintenance and wiring aisles can be maintained and the interface with the cable rack can be engineered.

Switching systems with lineups of equipment that include system cable racks may deviate from the nominal dimensions of width and depth and meet the requirements for lineup conformity in Section 2.1. Figure 2-6 is an example of a system with different frame dimensions that meets the spatial criteria. This figure is for illustrative purposes only.

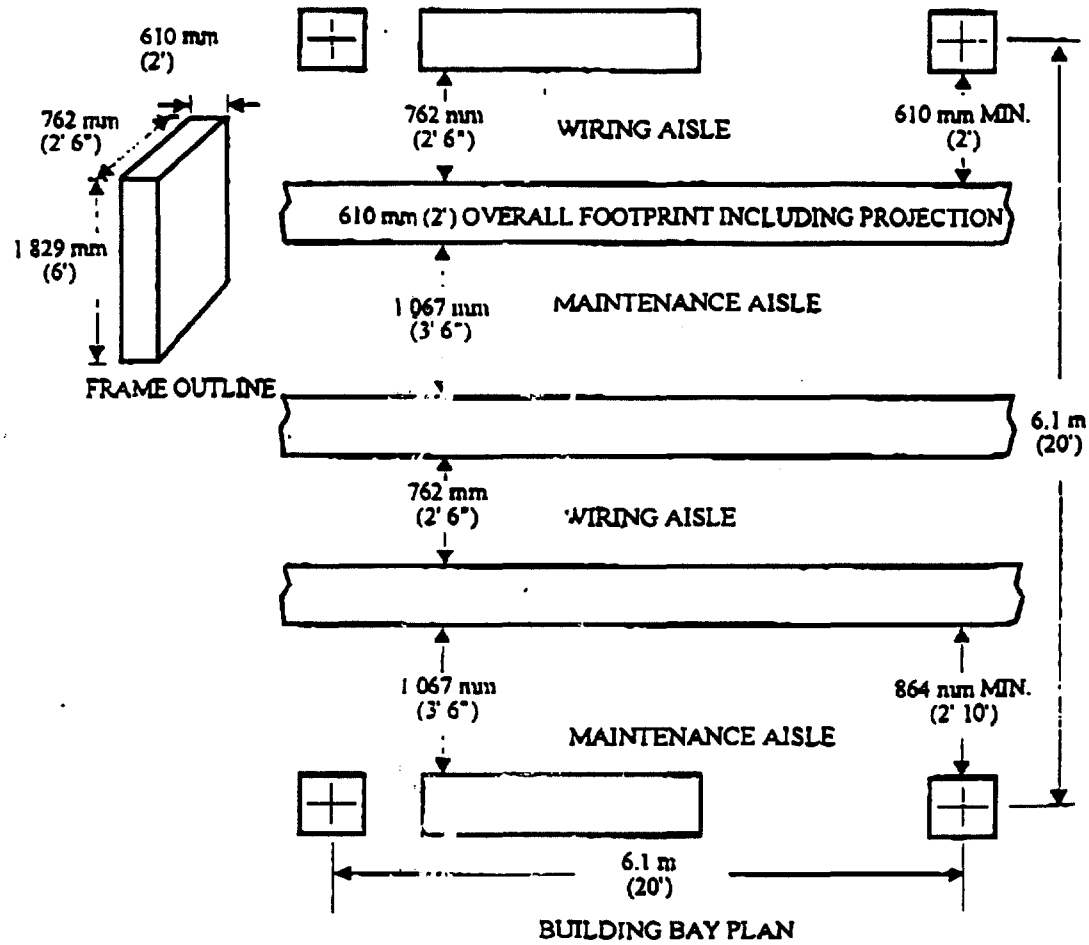


Figure 2-6. Typical Equipment Area Using Frames 1829 mm (6 ft, 0 in) High, 762 mm (2 ft, 6 in) Wide, and 610 mm (2 ft, 0 in) Deep

2.2.3 Equipment Frame Interface with Cable Rack

R2-15 [15] Equipment frames shall be capable of supporting and providing a fastening arrangement for all system Cable Distribution Systems (CDSs). The design of the interface between the frame and CDS shall permit the insertion or removal of a frame from an equipment lineup. To permit this insertion or removal, a minimum clearance of 10 mm *(0.39 in)*, except for spacers, shall normally be provided between the top of the frames and the bottom of the CDS.

O2-16 [16] Framework top cross-member should provide the following fastenings: a minimum of two 13-mm *(0.51-in)* diameter holes (with room for a nut) or two M10 *(or 3/8 - 16)* tap-through holes (with at least four full threads). The holes shall be located on the longitudinal center line and 121 mm *(4.75 in)* to either side of the front-to-back center line of the framework top, as Figure 2-7 shows.

When the fastenings in the top of the framework do not align with the holes in the system lineup rack, an adapter plate that mounts on the top of the framework may be used as Figure 2-7 shows.

2.2.4 Equipment Frame Lineup Conformity

R2-17 [17] End guards for equipment frames shall be as wide as the equipment frames are deep and extend the full height of the frame. The minimum aisle spacings must be maintained when the end guards are added to an equipment lineup.

2.2.5 Equipment Frame Floor Loading

O2-18 [18] An individual frame should be limited to a floor load of 560 kg/m^2 *(114.7 lb/ft^2)*. The floor load for an equipment frame is calculated by dividing the frame weight by the area of a rectangle bounded by the extended frame sides and the center line of the standard front (762 mm or *(2 ft, 6 in)*) and rear (610 mm or *(2 ft)*) aisles.

R2-19 [19] An equipment frame shall be able to support all overhead CDSs and lights located up to 3048 mm *(10 ft)* above the floor and having a maximum weight of 125 kg/m^2 *(25.6 lb/ft^2)*. In partially equipped lineups, CDSs and lights may be partially supported by floor-mounted stanchions. Over unequipped areas, via CDSs (defined in Section 2.5) may be supported by stanchions or from the ceiling.

In addition to the 560-kg/m^2 *(114.7-lb/ft^2)* equipment frame load and the 125-kg/m^2 *(25.6-lb/ft^2)* CDS and lighting fixture load, there is a 50-kg/m^2 *(10.2-lb/ft^2)* transient load. The sum of these individual loads equals the floor loading limit of 735 kg/m^2 *(150.6 lb/ft^2)*.

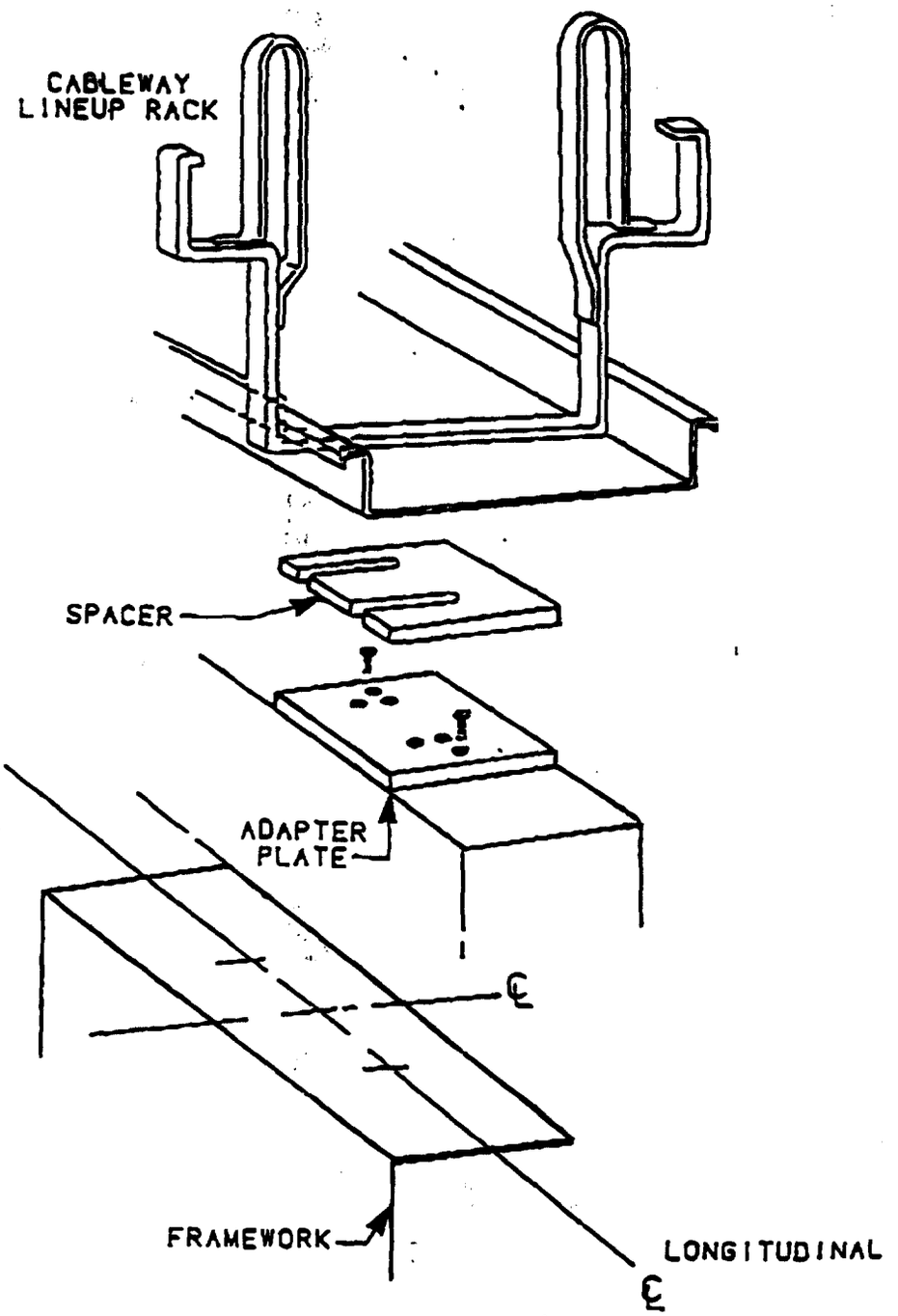


Figure 2-7. Typical Adapter Plate, Spacer, and Hole Locations in the Top of the Framework

2.2.6 AC Convenience Outlets Within Equipment Frames

R2-20 [20] The base of each frame, behind the front and rear guardrails, shall have space for ac power distribution for convenience outlets. The sides of the frame base must be sufficiently open or have holes that permit distribution wire to run through the frames. The front and rear of the frame base and/or guardrail shall provide the means and location for convenience outlets. When design control for a system includes the end guards at both ends of a lineup, the convenience outlets may be located in the end guards instead of in the base of each individual frame.

R2-21 [21] Alternating current power distribution for connecting outlets or lighting fixtures that may be part of the frame assembly shall be designed and constructed to comply with the National Electrical Code (NEC), except where those requirements are superseded by applicable local electrical and building codes.

2.3 Distributing and Interconnecting Frames

This section presents spatial and floor loading requirements that are unique to distributing frames and interconnecting frames.

2.3.1 Distributing Frames (DFs)

Distributing Frames are defined as frames that are never installed in lineups with equipment frames, such as the following:

Main Distributing Frame (MDF)

Protector Frame (PF).

Figure 2-8 shows a typical network distributing frame area. Objectives and requirements for the frames (which include associated overhead dedicated cabling and cable racks) are described below.

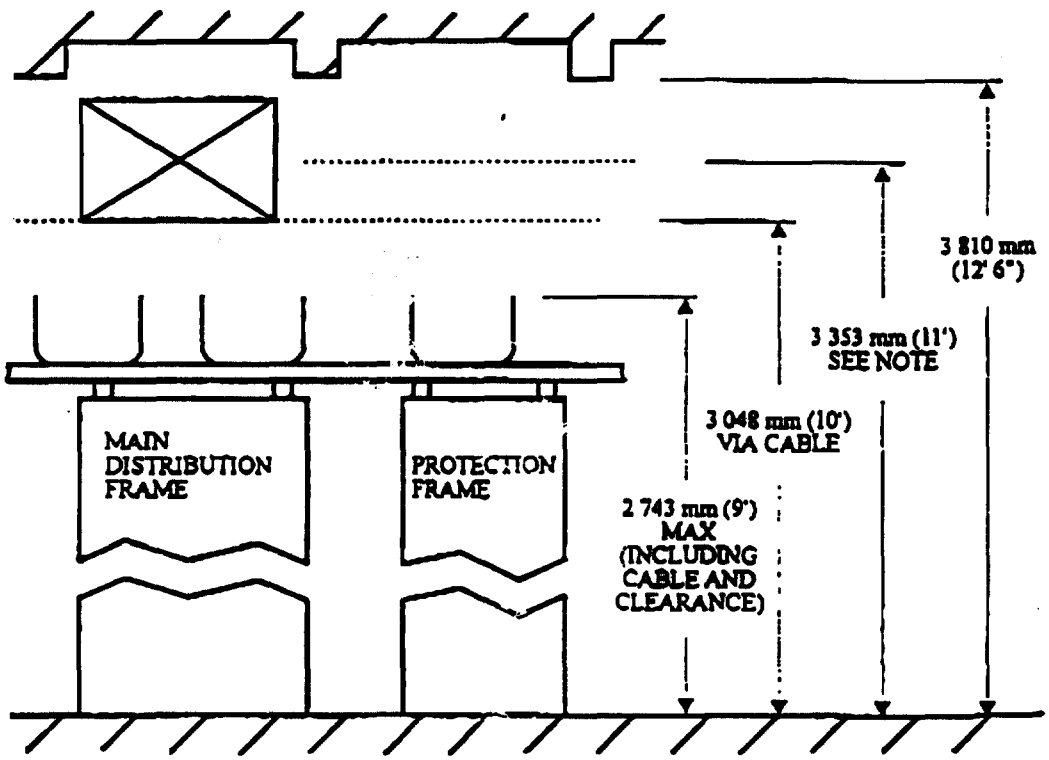
O2-22 [22] Frames should have a maximum height of 2743 mm *(9 ft)* including associated system cabling (which includes all terminating cabling and racks). The space from 2743 mm to 3048 mm *(9 to 10 ft)* should be shared between the system and nonterminating via cabling. In long DF lineups, system cabling may be more than 2743 mm *(9 ft)* but must be less than 3505 mm *(11 ft, 6 in)* above the floor.

... Nonconforming frames may be used with the requirements in this document; however, special consideration is necessary to ensure the frame

cabling will not interfere with via cabling, air ducts, or other building systems.

R2-23 [23] Frames shall have a maximum floor load of 675 kg/m^2 *(138.3 lb/ft^2)*. This uniform load is the total weight of all distributing frame equipment in the area, including cabling and racks, divided by the associated floor area, including aisles. When such areas exceed 37.2 m^2 *(400 ft^2)*, any 6.1-m by 6.1-m portion *(20-ft by 20-ft)*, regardless of its location relative to the columns, should not exceed the floor load requirement.

O2-24 [24] Frames should be capable of supporting all overhead cable distribution systems and lights. In partially equipped lineups, cabling and lights may be supported by floor-mounted stanchions.



NOTE: THE SPACE BETWEEN THE 3 248 mm (10') AND 3 353 mm (11') LEVELS IS NORMALLY RESERVED FOR AIR CONDITIONING DUCTS, BUT OVER THE MAIN FRAME. THIS SPACE MAY BE REQUIRED FOR CABLE PILEUPS.

Figure 2-8. Typical Network Distribution Frame Area

2.3.2 Interconnecting Frames (IFs)

Interconnecting Frames are defined as frames that may be installed in lineups with equipment, or in separate lineups parallel or perpendicular to equipment frame lineups, such as the following:

Intermediate Distributing Frame (IDF)

Circuit Concentration Bay (CCB)

Group Distributing Frame (GDF)

Digital System Cross-connect (DSX)

Quick Connect and Cross-connect (QCX)

Trunk Distributing Frame (TDF)

Fiber Distributing Frame (FDF).

IFs are subject to all equipment frame criteria Section 2.2. FDFs with depths greater than 305 mm *(12 in)* may be used as distributing frames.

2.4 DC Power Plant Equipment

This section presents spatial and floor loading requirements that are unique to dc power plant equipment.

2.4.1 Centralized DC Power Plant Equipment

Centralized DC Power Plant Equipment — dc power plant equipment that is located in a separate "power room" or designated "power plant equipment area" that is typically separate from the equipment frame area. A single power plant may serve one or more load equipment systems.

R2-25 [25] The height of centralized dc power plant equipment, including all superstructure and overhead facilities such as cable, cable racks, and bus bars, shall not exceed 3048 mm *(10 ft)*. This vertical space allocation also includes any vertical clearance (headroom) necessary for installation, operation, and maintenance. Figure 2-9 shows a typical centralized dc power plant equipment area.

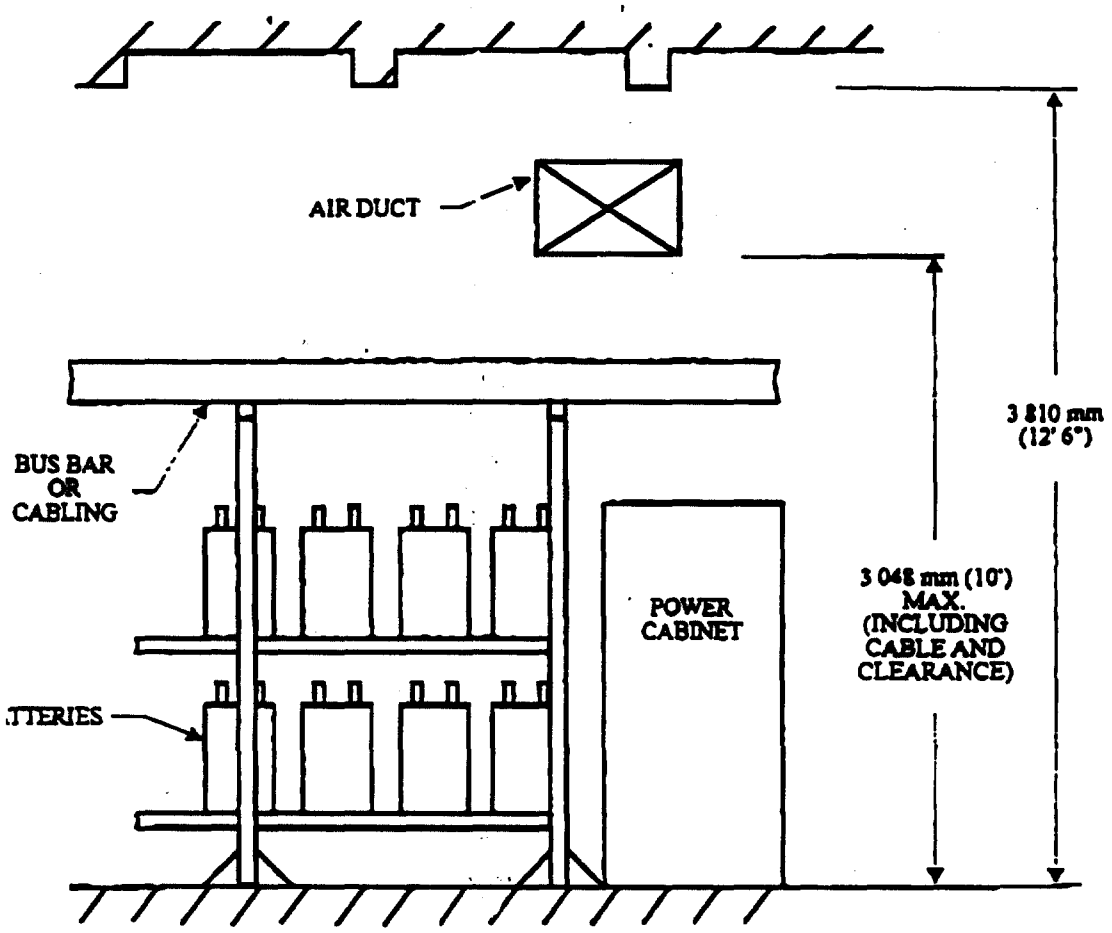


Figure 2-9. Typical Network DC Centralized Power Plant Equipment Area

R2-26 [26] Minimum aisle spacing for the centralized dc power plant equipment area shall be 762 mm *(2 ft, 6 in)* for the maintenance aisle and 610 mm *(2 ft)* for the wiring aisle.

O2-27 [27] Equipment frames should be capable of being installed on building floor structures having a total floor load capacity of 735 kg/m^2 *(150. 6 lb/ft^2)*. Centralized dc power plant frames are allocated 700 kg/m^2 *(143.4 lb/ft^2)* with 50 kg/m^2 *(10.2 lb/ft^2)* allocated for transient loads (see Section 2.2).

System design considerations and individual site characteristics (e.g., base slab installations or existing high-capacity floor structures) may justify the use of floor loadings greater than 700 kg/m^2 *(143.4 lb/ft^2)* for centralized dc power plant equipment. A frame that exceeds the 700 kg/m^2 requirement is designated a concentrated load and may require site specific engineering.

O2-28 [28] Centralized dc power plant equipment should support all overhead CDSs, bus bars, and lights. In partially equipped areas, these elements may be supported by floor-mounted stanchions. Centralized dc power plant equipment shall be designated for base-mounted attachment to the floor without auxiliary support or bracing from the ceiling or side walls. When so supported, centralized dc power plant equipment shall be capable of withstanding the network environments, including the earthquake environments, that Section 4 describes. Lineup or Frame-Mounted DC Power Equipment

Lineup or Frame-Mounted DC Power Equipment — dc powerplant equipment units that can be installed in equipment frame lineups as Sections 2.1 and 2.2 discuss. The criteria in Section 2.1 and 2.2 apply to line-up dc power equipment.

2.5 Cable Distribution Systems (CDSs)

CDSs consist of cable, racks, and supports, and are grouped into two categories:

System CDSs — CDSs designed for exclusive use with, and dedicated to, a particular equipment system. They are used for cabling frames within a system. In this context, system means a number of frames and associated cables, all with a single major function.

Via CDSs — CDSs designed to transport cable that originates outside a particular equipment system and passes over it, or terminates in it. Via racks include vertical cable runs in multi-story facilities. They usually consist of ladder or bar-type racks.

2.5.1 CDS Requirements

2.5.1.1 General

CDSs shall conform to the earthquake and office vibration requirements of Section 4.4.

CDSs shall conform to the grounding requirements in GR-1089-CORE, *Electromagnetic Compatibility and Electrical Safety Generic Criteria for Telecommunication Equipment.* The via cable racks are connected to the office integrated ground plane and must be isolated from system racks connected to the isolated ground plane. The system cable racks are

connected to the equipment system ground (isolated ground plane for Stored Program Control Switching Systems).

2.5.1.2 Overhead Cable Distribution

The CDS should provide cable pathways that are located, sized, and allocated to meet the requirements of Section 2.5.2, as appropriate.

O2-29 [29] At least one cross-aisle pathway per building bay should be reserved for via cabling.

O2-30 [30] System and via lineup racks should be centered over the equipment lineups to minimize interference with installer access, and air and light distribution in the aisles.

O2-31 [31] System CDSs should be supported by the associated equipment frames/cabinets, or by stanchions in partially equipped lineups, with provision for inserting or removing frames/cabinets from a lineup. Via CDSs may be supported by the frames/cabinets or from the ceiling.

O2-32 [32] System CDSs should be coordinated with frame-and-aisle lighting so the system conforms to the illumination requirements of Section 4.7.

O2-33 [33] System CDSs should provide adequate clearance for transporting frames in an erected position through the maintenance aisle.

2.5.1.3 Cable Distribution Under Raised Floor

Some designs may provide an option for system cabling to be installed under a raised floor. In this case, overhead space allocations for system CDSs may be traded for space under the floor. Requirements for overhead via CDSs do not change.

R2-34 [34] Cabling under the raised floor shall conform to the requirements of the NEC and applicable state and local codes.

R2-35 [35] The underfloor CDS shall provide for monitoring with smoke detectors and for protecting the cables against malfunctions caused by water leaks and dampness.

O2-36 [36] Communication cables should be segregated from power cables to avoid physical damage and electrical interference.

2.5.2 Cable Pathways Over Equipment Frame Areas

Above 2134-mm *(7-ft)* high equipment, the 2134-mm to 3048-mm *(7-ft to 10-ft)* cable pathways space is typically allocated between system and via cable racks, lights, passages for cooling air, and installer access. This section specifies the plan for allocating cable pathways.

2.5.2.1 Elements of Allocation Plan

The cable pathway plan coordinates the locations of elements of the equipment-building system, including the structural columns, cable holes, ceiling inserts, cooling air ducts and diffusers, smoke detectors, equipment frame lineups, cable racks, and equipment aisle lighting. Specifically, the plan provides system and via cable pathways at different levels, both parallel and perpendicular to equipment frame lineups. It creates large unobstructed openings between cross-aisle pathways. The pathways permit cooling air to flow down to equipment from or above the 3048-mm *(10-ft)* level, and provide good access to all cable racks. The plan ensures vertical cable holes are not blocked by cable pathways, and lights are placed in an ideal location. The air flow from the top of the equipment frames should not be blocked by cable trays, lighting fixtures, or other large impediments.

Figure 2-10 shows a typical plan for 305-mm *(12-in)* deep frames. This plan can be adjusted to work in buildings with different column and cable-hole spacings. Cable pathways dedicate the various spaces during the life of the equipment-building system.

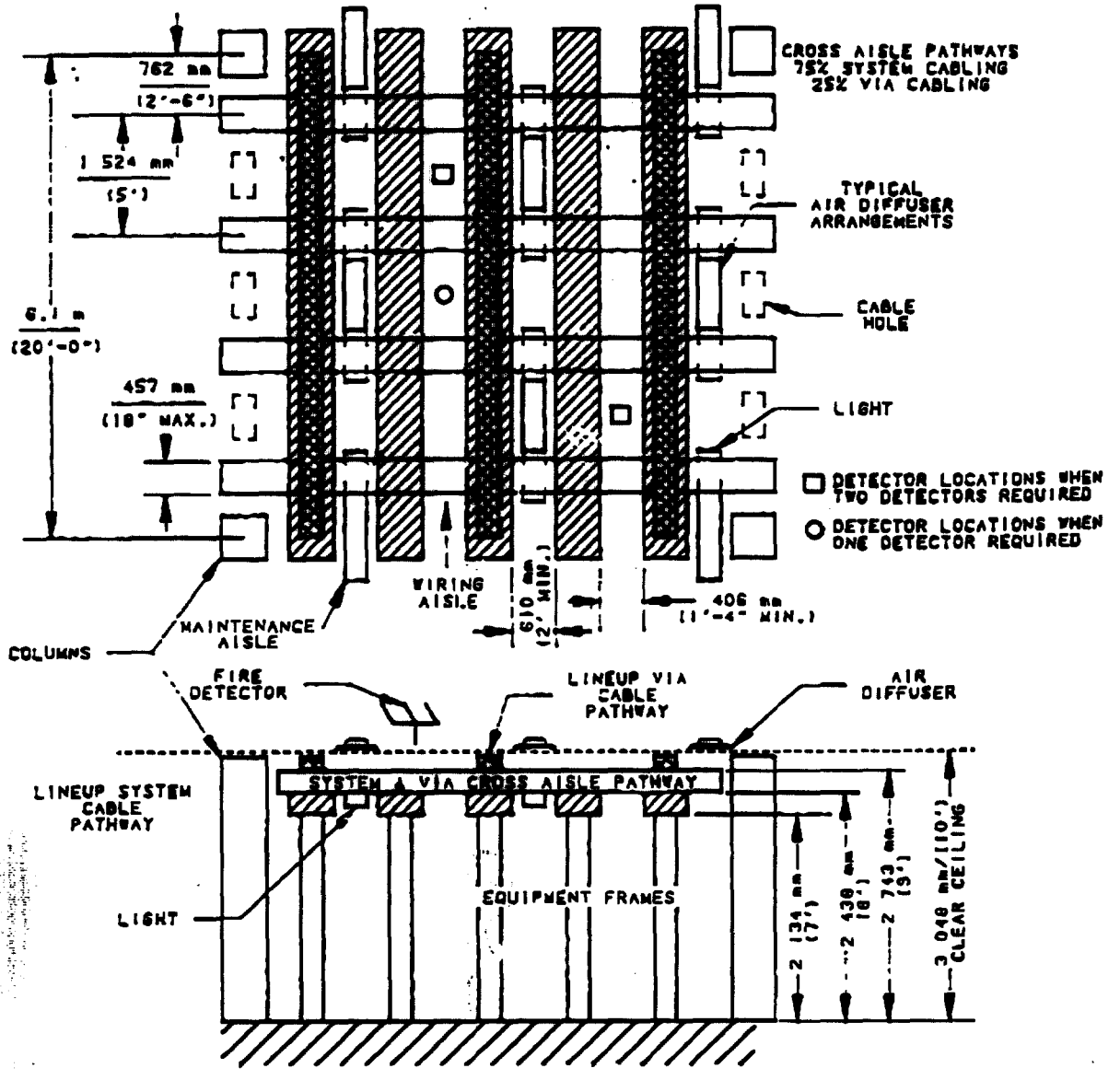


Figure 2-10. Typical Cable Pathways for 305-mm (12-in) Deep Frame Areas (Conventional Cooling System - Air Diffusers)

2.5.2.2 System Cable Racks

System cable racks running parallel to equipment lineups typically occupy the space in the cable pathways 2134 mm to 2438 mm *(7 to 8 ft)* above the floor and directly over the lineups. System cable racks running perpendicular (cross-aisle) to equipment lineups are typically 2438 mm to 2743 mm *(8 to 9 ft)* above the floor across the equipment area.

2.5.2.3 Via Cable Racks

Via cable racks running perpendicular (cross-aisle) to equipment lineups are typically 2438 mm to 2743 mm *(8 to 9 ft)* above the floor across the equipment area. Via cable racks running parallel to equipment lineups shall be located within the cable pathways and are typically 2743 mm to 3048 mm *(9 to 10 ft)* above the floor, directly over the lineups. The lineup via pathways should have a maximum width of 305 mm *(1 ft)*. The locations of lineup via cable racks shall be designated on system floor and cabling plans.

2.5.2.4 Lights

Lights may be supported from the CDS and thus by the frames below. Lights are located over maintenance aisles and below cross-aisle cable pathways. The vertical height of the fixture above the floor should not restrict installation of new frames in a lineup, and must permit adequate frame illumination as Section 4.7 describes. Lights should be located within the lighting pathways, shown in Figure 2-10, in an arrangement that allows access to overhead cable racks.

2.5.3 Cable Pathways Over Distributing Frame Areas

A cable pathways plan should be prepared for each DF area. This plan should allocate the space over DFs to system and via cable racks, lights, and installer access. System cabling interconnects different parts of the same DF and includes terminating via cable. The other via cabling passes over the frame. Figure 2-11 shows a typical cable pathways plan for a DF area.

2.5.4 CDS Floor Load and Support

O2-37 [37] The floor load from overhead CDSs (including lights) should not exceed 125 kg/m^2 *(25.6 lb/ft^2)*. The system CDSs are allocated 100 kg/m^2 *(20.5 lb/ft^2)* and via CDSs are allocated 25 kg/m^2 *(5.1 lb/ft^2)*. This weight allowance may be averaged over an area not exceeding 6.1-m by 6.1-m *(20-ft by 20-ft)* square and must include all cable, rack, lights, and associated support hardware.

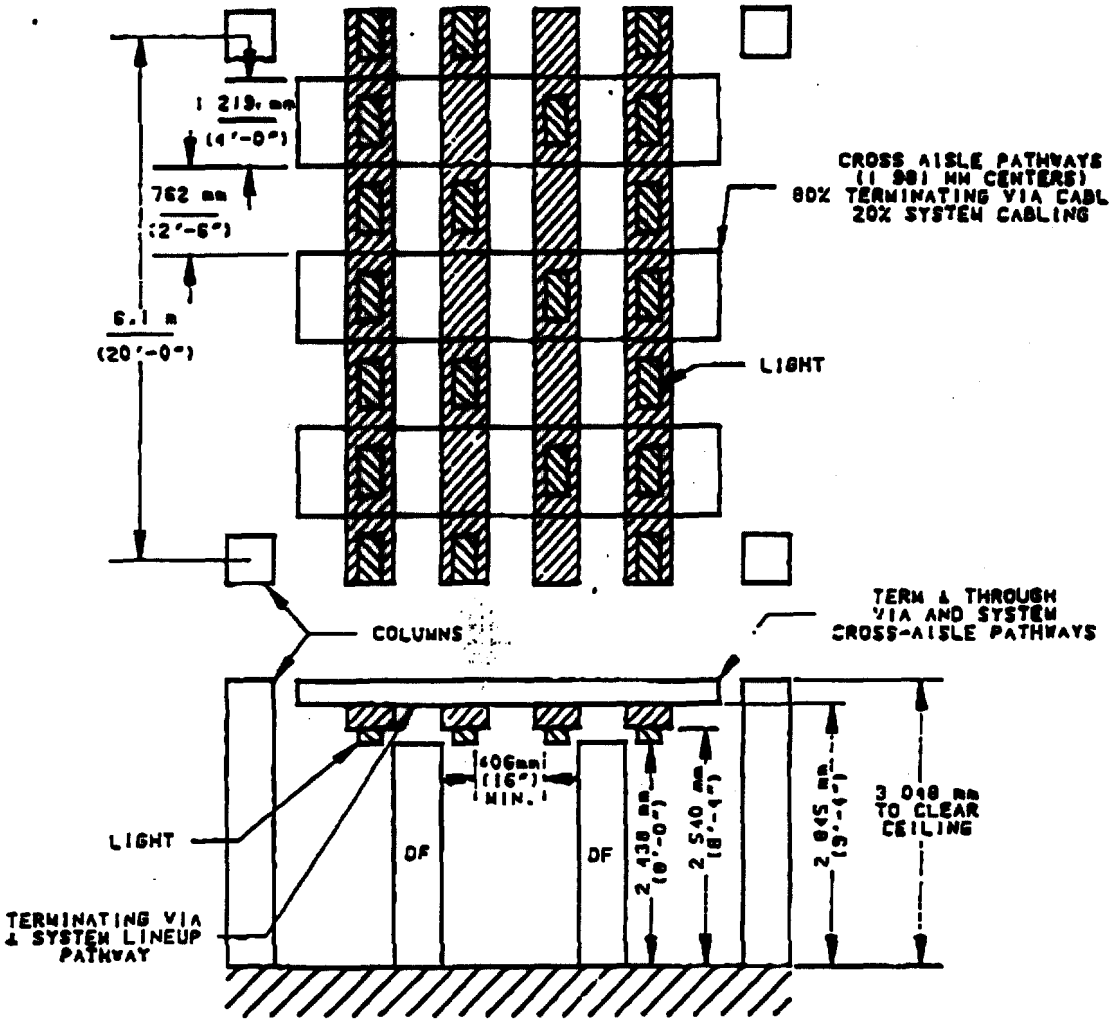


Figure 2-11. Typical Cable Pathways for a Distributing Frame Area

2.6 Operations Systems (OSs)

OSs assist in maintenance, operations, administration, and record-keeping. Many of the OSs use minicomputers and general-purpose computers. OSs can have either a single-site or distributed configuration. They may be located in switching and transmission equipment frame areas, in separate areas or rooms, or in both.

[38] OS facilities located in equipment frame areas shall be subject to the spatial and weight requirements outlined in Sections 2.1 and 2.2. They also